

**Notice of Allowability**

Application No.

10/687,371

Applicant(s)

KAMPS, BILL

Examiner

Art Unit

Victor J. Taylor

2863

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to June 6, 2005.
2. ☒ The allowed claim(s) is/are 1-6 and 2039.
3. ☒ The drawings filed on 08 February 2004 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date 10
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

ANDREW H. HIRSHFELD  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800

## **DETAILED ACTION**

### ***Drawings***

1. The drawings were received on 2/08/2005. These drawings are approved.

### ***Information Disclosure Statement***

2. The information disclosure statement filed 8 December 2003 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because references cited as C-22 to C-31 and references C-33 to C-33 do not cite the date of publication and are not in compliance with 37 CFR 1.97, 1.98 and MPEP 609. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements statements under 37 CFR 1.97(e). See MPEP § 609 C(1).

### ***Response to Arguments***

3. Applicant's argument and the amendments to the specification on 6/16/2005 of record with respect to the objection to the specification have been fully considered and are persuasive. The objection to the specification on February 8, 2005 is moot and has been withdrawn.
4. Applicant's arguments see the response filed 16 June 2005 with respect to the amendments and to the arguments of record with respect to the claim limitations of

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record have been fully considered and are persuasive. The 102 (b) rejection of 9 March 2005 is moot and has been withdrawn.

***Allowable Subject Matter***

5. Claims 1-6, and 20-39 are allowed. Claims 20-39 were previously allowed on 9 March 2005. The applicant has cancelled claims 7-19.

6. The following is a statement of reasons for the indication of allowable subject matter:

Regards to claim 1, concerning the applicant arguments of record for the amorphous computing system with limitations directed to “a first processing pipeline wherein the first processing pipeline is operable to update a first seismic image point” in combination with limitations of “and define a second plurality of hardware gates within the amorphous hardware element to form a second processing pipeline wherein the second processing pipeline is operable to update a second seismic image point independent of the first processing pipeline” used to produce the multiple independently operable data pipelines for processing the seismic data is not found in the cited art of record.

Therefore the claimed combination of limitations found in:

I. Independent claim 1 with the FPGA amorphous computing system for computing seismic data with apparatus for “a first amorphous hardware element “[...[combined] with the “computer processor communicably coupled to the amorphous hardware element and to a computer readable medium wherein the computer readable medium includes instructions executable by the computer processor to ” process

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seismic data...[and in combination with the steps used to] "define a first plurality of hardware gates within the amorphous hardware element to form a first processing pipeline, wherein the first processing pipeline is operable to update a first seismic image point"...[and/or] in combination with the explicit steps used to "define a second plurality of hardware gates associated with the amorphous hardware element to form a second processing pipeline wherein the second processing pipeline is operable to update a second seismic image point independent of the first processing pipeline" used to compute the seismic data images as amended and argued in the response on 6/16/2005 of record is not found in the cited art of record.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 2-6 are variously dependent on the allowed independent claim 1 and are allowed at least for the reasons cited above.

Regards to claim 20, the applicant arguments of record for the amorphous computing system for implementing a Kirchoff algorithm with limitations directed to "a field programmable gate array"...[and] with limitations directed to "a computer processor communicably coupled to the field programmable gate array and to a computer readable medium, wherein the computer readable medium includes a set of coefficients for a high frequency filter corresponding to a threshold noise frequency and a set of coefficients for a sync filter and with instructions executable by the computer processor to" "define a first plurality of hardware gates within the field programmable gate array to form a first processing pipeline wherein the first processing pipeline implements"

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combined with the combination of limitation functions used to produce multiple independently operable seismic data pipelines for processing the seismic data is not found in the cited art of record.

Therefore the claimed combination of limitations found in:

II. Independent claim 20 for a FPGA computational system used to Implement a Kirchhoff algorithm with apparatus for "a field programmable gate array" [combined with] "a computer processor communicably coupled to the field programmable gate array and to a computer readable medium, wherein the computer readable medium includes a set of coefficients for a high frequency filter corresponding to a threshold noise frequency and a set of coefficients for a sync filter and with instructions executable by the computer processor "...[and] with steps used to process and "define a first plurality of hardware gates within the field programmable gate array to form a first processing pipeline, wherein the first processing pipeline is operable to update a first seismic image point and wherein the first processing pipeline implements the following functions"...[combined with and used to process] the explicit steps for "a first function, wherein the first function interpolates a velocity function to calculate a velocity at an image point"...[and] "a second function, wherein the second function utilizes the velocity to calculate a time of the data trace that contributes to the image point"...[and] "a third function, wherein the third function utilizes the time of the data trace to calculate a real sample number of the data trace, and wherein the real sample number of the data trace is a fractional offset from a whole sample number of the data trace"...[and] "a fourth function, wherein the fourth function filters a plurality of whole sample numbers of the

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data trace that straddle the real sample number of the data trace using the set of coefficients for a high frequency filter”...[and] “a fifth function, wherein the fifth function uses the set of coefficients for a sync filter to interpolate the filtered plurality of whole number samples to the real sample number...[and] “a sixth function, wherein the sixth function sums the output of the fifth function into an output trace at the image point”...[and] with steps used to “and a second plurality of hardware gates associated with the FPGA to form a second processing pipeline, wherein the second processing pipeline is operable to update a second seismic image point independent of the first processing pipeline and wherein the second processing pipeline implements the following functions”...[and] combined with and used to implement the explicit steps for “the first function, wherein the first function interpolates a velocity function to calculate a velocity at an image point”...[and] “the second function, wherein the second function utilizes the velocity to calculate a time of the data trace that contributes to the image point”...[and] “the third function, wherein the third function utilizes the time of the data trace to calculate a real sample number of the data trace, and wherein the real sample number of the data trace is a fractional offset from a whole sample number of the data trace”...[and] “the fourth function, wherein the fourth function filters a plurality of whole sample numbers of the data trace that straddle the real sample number of the data trace using the set of coefficients for a high frequency filter”...[and] “the fifth function, wherein the fifth function uses the set of coefficients for a sync filter to interpolate the filtered plurality of whole number samples to the real sample number...[and] “the sixth function,

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wherein the sixth function sums the output of the fifth function into an output trace at the image point” is not found in the cited art of record.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Regards to claim 21, a method of computing a plurality of seismic data traces from a plurality of seismic data input traces with method steps for “segregating the input traces into a plurality of sets of input traces and “programming the groups of hardware gates within an amorphous hardware element (FPGA) with each group of programmed hardware gates comprising a separate processing pipeline implementing at least a portion of a seismic imaging algorithm” and processing the seismic data through the plurality of seismic data pipelines is not found in the cited art of record.

Therefore the combination of claim limitations found in:

III. Independent claim 21 for a method of computing a plurality of seismic data traces from a plurality of seismic data input traces with method steps for “segregating the input traces into a plurality of sets of input traces”...[and] combined with the steps “for programming the groups of hardware gates within an amorphous hardware element (FPGA) with each group of programmed hardware gates comprising a separate processing pipeline implementing at least a portion of a seismic imaging algorithm”...[and/or] in combination with the explicit steps for “operating the amorphous hardware element to process at least a portion of the plurality of sets of input traces through the processing pipelines into at least a portion of the plurality of output traces”

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to implement and process seismic image data as amended and argued in the response on 6/16/2005 of record is not found in the cited art of record.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 22-39 are variously dependent on the allowed independent claim 21 and are allowed at least for the reasons cited above.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor J. Taylor whose telephone number is 571-272-2281. The examiner can normally be reached on 8:00 to 5:30 PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow can be reached on 571-272-2863. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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8. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VJ Taylor

  
June 22, 2005.



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